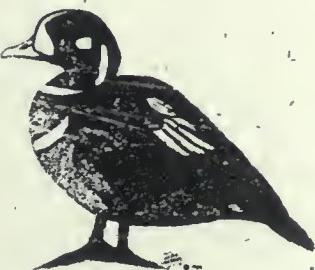


Harlequin Duck Surveys in Western Montana: 1994



A Report to:

USDA Forest Service

Kootenai National Forest
506 U.S. Highway 2 West
Libby, MT 59923

Submitted by

JAMES D. REICHEL
and
DAVID L. GENTER

Montana Natural Heritage Program
1515 East Sixth Avenue
Helena, Montana 59620

January 1995

Call #: S
598.41
N11HDS
1995

1

U

Barcode:

Montana State Library



3 0864 1004 7138 5

ISSUED TO

DATE

© 1995 Montana Natural Heritage Program

This document should be cited as follows:

Reichel, J.D. and D.L. Genter. 1995. Harlequin Duck surveys in western Montana: 1994. Montana Natural Heritage Program. Helena, MT. vii + 57 pp.

ABSTRACT

Breeding pair surveys for Harlequin Ducks were done on 242 km of 18 streams during May and June, 1994; a total of 57 Harlequins (32 males, 25 females) were seen on 9 streams. Brood surveys were done on 245 km of 14 streams during July and August, 1994; a total of 82 Harlequins (15 females, 67 young in 15 broods) were seen on 8 streams. Harlequins were reported on 2 additional streams. Reproductive success, on streams surveyed both for pairs and broods, averaged 0.33 broods per female. Average brood size at or near fledging (Class III) was 4.00. Breeding was confirmed on Grave Creek (Fortine) for the first time in 1994; 4 adult ducks were seen on Swift Creek, more than previously reported. We found ducks on Sullivan Creek in 1994, where they were not found during 1993. No birds were seen during pair (May) or brood (August) surveys on Big Creek (Koocanusa), which had Harlequins in 1990, nor on a brood survey of the North Fork of the Blackfoot River, where ducks were seen in 1993.

We continued banding Harlequin Ducks in the Flathead and Clark Fork drainages. Thirty-five Harlequins (7 adult males, 7 adult females, and 19 juveniles) were marked on 7 streams. This brings the total number of Harlequin Ducks banded in Montana since 1991 to 194: 29 adult males, 41 adult females, and 122 juveniles. We observed 11 birds previously marked as adults on streams. Additionally, we found 9 adult females marked as juveniles in 1992 on the streams where they were seen in 1994. The banding program, while small in scale for waterfowl, is providing a significant tool for local monitoring and identifying coastal areas where Montana breeding birds molt and winter.

Two noteworthy movements were detected in 1994: a male marked on McDonald Creek, Glacier National Park, on 6 May 1993, was captured on Hornby Island, along the southeast coast

of Vancouver Island, British Columbia on 5 August 1993 and again on 4 August 1994. On 11 August 1994 a male, marked as a juvenile on McDonald Creek exactly two years earlier, was captured at Shelter Point on the coast south of the Campbell River, on Vancouver Island, B.C.

ACKNOWLEDGMENTS

We thank Bob Summerfield at the Kootenai National Forest Supervisor's Office for his help throughout the study. We were assisted with field work by Chad Castren. Additional help, location of possible trapping sites, and other logistical support was provided by J. Ashley, J. Davies, R. Galloway, C.E. Hidy, T. Hidy, W. Johnson, E. Pfalzer, and other Forest Service and Park Service personnel. M. Beer and C. Jones assisted with element occurrence and map preparation. Financial support for the project came from the Kootenai National Forest (U.S. Forest Service, Northern Region) and the Montana Natural Heritage Program (Natural Resource Information System and The Nature Conservancy).

This report presents valuable information on the life history, productivity, movements and site fidelity the of Harlequin Duck. Efforts began in 1987 and have expanded to the present scope, representing the longest ongoing study of breeding Harlequin Ducks that we are aware of in North America. While the funding has been modest at best, the results have already been implemented for management of the species and its habitat. Funding for the past two years has dwindled to only two or three sources. The continued operation of efforts to survey, mark, and monitor Harlequin Ducks is dependent on additional funding and a broader base of contributors. Please contact the Natural Heritage Program office if you or your organization is able to participate in supporting this work.

TABLE OF CONTENTS

ABSTRACT	iii
ACKNOWLEDGMENTS	v
LIST OF TABLES	vii
LIST OF FIGURES	vii
INTRODUCTION	1
METHODS AND MATERIALS	4
RESULTS AND DISCUSSION	5
Surveys	5
Kootenai National Forest	5
Flathead National Forest	5
Helena and Lolo National Forests	6
Stillwater State Forest	6
Breeding Chronology	8
Reproduction	8
Capture and Marking	9
Relocation of Marked Birds	10
Movements	11
MANAGEMENT RECOMMENDATIONS AND RESEARCH NEEDS	16
LITERATURE CITED	19
APPENDICES	22
Appendix A. Streams surveyed for Harlequin Ducks in 1994	23
Appendix B. Miscellaneous reports of Harlequin Ducks during 1994	26
Appendix C. Data forms	27
Appendix D. List of Harlequin Ducks marked in 1994 or marked in previous years and sighted in 1994	33
Marten Creek, Kootenai National Forest	33
Vermilion River, Kootenai National Forest	36
Rock Creek, Kootenai National Forest	38
Grave Creek, Kootenai National Forest	39
Trail Creek, Flathead National Forest	40
Spotted Bear River, Flathead National Forest	41
Sullivan Creek, Flathead National Forest	42
Glacier National Park	43
Appendix E. Element Occurrence Records from 1994 Surveys	44

LIST OF TABLES

Table 1. Harlequin Duck reproduction in 1994 for streams with both pair and brood (at fledging) information.	12
Table 2. Harlequin Duck reproductive parameters 1988-1994	13
Table 3. Summary of harlequin ducks marked in 1994	14
Table 4. Sightings and recaptures in Montana of adult Harlequins marked in Montana 1991-1993 and adult females marked in spring 1994.	15

LIST OF FIGURES

Figure 1. Harlequin Duck Breeding Locations in Montana	7
--	---

INTRODUCTION

The Harlequin Duck (*Histrionicus histrionicus*) is a small sea duck, which travels inland to breed on freshwater streams. The male is strikingly colored with black and white spots and crescents, and chestnut sides on a deep cobalt blue background. The female is dull brown with three white spots on the face. Harlequins breed in western North America from Alaska and the Yukon south through western Montana to California (Cassirer et al. 1993); in eastern North America they breed from Baffin Island south to eastern Quebec and Labrador (Goudie 1993). In the Palaearctic they breed in Iceland, Greenland and Siberia (A.O.U. 1983). Approximately 110 pairs of Harlequins currently breed in Montana (Genter 1993), with most located in the following areas: 1) tributaries of the lower Clark Fork River; 2) tributaries of the North, Middle, and South Forks of the Flathead River; 3) streams coming off the east front of the Rocky Mountains; and 4) the Boulder River (Miller 1988, 1989; Kerr 1989; Carlson 1990; Fairman and Miller 1990; Diamond and Finnegan 1992, 1993; Reichel and Genter 1993, 1994).

During the breeding season Harlequins are found along fast mountain streams (Bengtson 1966). In many areas Harlequins use streams with dense timber or shrubs on the banks (Cassirer and Groves 1990), but they are also found in relatively open streams along the east slopes of the Rocky Mountains, Montana (Markum and Genter 1990, Diamond and Finnegan 1992) and the Arctic tundra (Bengtson 1972). In Idaho, 90% of observations occurred near old growth or mature timber stands (Cassirer and Groves 1990). Mid-stream rocks, logs, islands, or stream-side gravel bars serve as safe loafing sites and appear to be important habitat components.

Most of the ducks arrive on their inland breeding areas in mid-April to early-May; unmated males typically arrive before pairs (Kuchel 1977). The males return to the coast shortly after the females begin incubation; most are gone by early July (Kuchel 1977). The females and

young remain on the streams until August or early September. This chronology is influenced by elevation and the timing of spring runoff and may vary up to several weeks between years.

The U.S. Forest Service, Region 1, lists the Harlequin Duck as Sensitive (Reel et al. 1989). The species is listed as a Species of Special Concern by the Montana (Montana Natural Heritage Program 1994) and Idaho (Idaho Conservation Data Center 1994) Natural Heritage Programs. The eastern North American population is listed as endangered in Canada (Goudie 1993); both eastern and western populations are listed under Category 2 as a candidate for listing under the Endangered Species Act by the U.S. Fish and Wildlife Service (U.S. Department of Interior 1991).

The Montana Natural Heritage Program began surveying Harlequin Ducks in 1988. The survey data gave rise to questions involving site fidelity, productivity and mortality. Individual marking of birds began to a limited extent in 1991 and through 1993 a total of 159 Harlequins (13 adult males, 14 adult females, 41 juveniles) were marked on 7 streams. During that time we observed 20 previously marked adults returning to Montana streams. Six movements detected in 1993 were of interest. A male marked on McDonald Creek, Glacier National Park, on 6 May 1993, was captured on Hornby Island, along the southeast coast of Vancouver Island, British Columbia on 5 August 1993. This was the first record of a bird marked in Montana being relocated on the coast. On 14-15 March 1994 three Harlequins were observed on Hornby Island, all marked as juveniles in 1992 and 1993 on McDonald Creek. Local movements of birds, heretofore undocumented, include two marked females found on different streams in 1993 than where they were originally marked in 1992. Stream mouths were separated by 6 and 17 km respectively, across a reservoir and lake (Ashley 1994a, Reichel and Genter 1994).

Long term goals include: 1) developing a baseline status report of current and historic Harlequin populations in Montana; 2) gathering information on site fidelity, reproduction and mortality to allow estimations of what constitutes viable Harlequin populations; 3) developing surveying protocols for actual and potential Harlequin streams; 4) developing management guidelines for maintaining and restoring Harlequin populations and habitat; and 5) identify coastal areas where Harlequins from the Northern Rockies occur. Goals for 1994 included: 1) surveying additional streams for presence and status of Harlequins; 2) gathering productivity data on some primary Harlequin streams; and 3) marking as many individuals as possible on selected streams for long-term monitoring.

METHODS AND MATERIALS

Harlequin Ducks were surveyed on parts of the Kootenai, Flathead, Helena, and Lolo National Forests and the Stillwater State Forest during May-August 1994 (see Fig. 1). Data sheets are shown in Appendix C. We also marked birds in Glacier National Park; surveys there were conducted primarily by Park Service personnel (Ashley 1994a, 1994b). Most surveys were conducted by walking the stream channel (when possible) or stream bank. In most cases the surveyor walked upstream, giving more time to observe the bird before it moved out of sight. Some larger streams were surveyed partially or completely by kayak. Dates, locations, distance surveyed, and general characteristics of the stream reaches surveyed were recorded; any Harlequins sighted were noted with location, numbers, ages, and sex of birds present and habitat at the site. For streams in the Flathead and Clark Fork drainages, we attempted to capture and mark all birds seen, when a licensed, qualified bird-bander was present on the survey (Reichel or Genter). Captured birds were identified to sex and age, weighed, measured (wing cord and tail), marked, and released. Except in Glacier National Park, all birds were marked with numbered USFWS aluminum leg bands and colored nasal discs, individually recognizable by shape and color combinations (see Appendix D). Birds in Glacier National Park were banded with a USFWS aluminum band and a unique combination of 3 plastic, colored leg bands; the upper leg bands were the narrow plastic-coated-wire band type.

RESULTS AND DISCUSSION

Surveys

Kootenai National Forest. Pair surveys were conducted along 91 km of 7 streams during May-June 1994 (Appendix A). A minimum of 35 Harlequins (20 males, 15 females) were seen on 4 streams (Appendix A & D). These included Grave Creek (3 pairs, plus 2♀), Marten Creek (5 pairs plus 4♂), Rock Creek (3 pairs plus 1♂), Swamp Creek (1♂), and the Vermillion River (2 pairs plus 1♂). The single male on Swamp Creek was seen in the bay at the outlet of Swamp Creek to the Clark Fork River. No birds were seen on Wigwam Creek, nor on Big Creek (Koocanusa) where a juvenile was seen in 1990 (Fairman and Miller 1990).

Brood surveys were conducted along 56 km of 4 streams during late July 1994 (Appendix A). A minimum of 16 different Harlequin Ducks were observed on 3 streams (Appendix A & D). Grave Creek had 1♀ present with a brood of 4 chicks. Rock Creek had 1♀ present with a brood of 3 chicks (♀ was a different individual from the 3 seen in spring). The Vermilion River had 1♀ present with a brood of 6 chicks. Marten Creek had no birds present.

Flathead National Forest. Pair surveys were conducted along 111 km of 8 streams during May-June 1994 (Appendix A). A minimum of 18 Harlequins (11 males, 7 females) were seen on 4 streams (Appendix A & D). These included Big Creek (1 pair), Spotted Bear River (2♀), Sullivan Creek (1 pair) and Trail Creek (3 pairs plus 6♂). The Trail Creek survey was during extremely high water and was probably an underestimate of the actual number of birds present; in fact no marked females were seen although a marked female was present with a brood in August.

Brood surveys were conducted along 133 km of 6 streams during July - August 1994 (Appendix A). A minimum of 66 different Harlequin Ducks were observed on 5 streams (Appendix A & D). These included: 1) Little Salmon River (1♀, 1 brood of 7 young); 2) Spotted Bear River (2♀, 2 broods of 4 and 5 young plus 3 birds which were probably a♀ with a brood of 2), and 3) Sullivan Creek (2♀, 2 broods of 5 and 7 young); 4) Trail Creek (2♀, 2 broods of 3 and 1 young; at least one of the females was a different individual than seen in the spring count); and 5) White River (4♀, 4 broods of 1, 6, 6, and 7 young). This is by far the highest reproduction recorded in the South Fork Flathead River drainage.

Helena and Lolo National Forests. Brood surveys were conducted along 38 km of 3 streams during July 1994 (Appendix A). No Harlequin Ducks were observed on any stream (Appendix A), including the North Fork of the Blackfoot River (Lolo NF) where they have been observed in at least one of the past five years. However, we did have a report of a pair at a nest on the North Fork Blackfoot (Appendix B). We got the report in mid-July, too late to check on it. However, it seems unlikely that both a male and female would be present at the nest site.

Stillwater State Forest. Pair surveys were conducted along 40 km of 3 streams in May and June 1994 Appendix A). A minimum of 4 different Harlequin Ducks (3♀, 1♂) were observed on Swift Creek (Appendix A & D). A single brood survey of 18 km on Swift Creek was made in August 1994, but no harlequins were seen (Appendix A).





Figure 1. Harlequin Duck Breeding Locations in Montana



Breeding Chronology

Breeding was early again this year, probably due to rapid spring runoff in May. As a result, many females apparently began incubation by mid-May. All young were nearly or completely fledged by the end of July on the Lower Clark Fork and North Fork Flathead drainages and 6 August on the South Fork Flathead drainages. This may have caused us to miss some broods on streams in both the lower Clark Fork drainage and Trail Creek. However, very low reproduction on Logan Creek this year, and high reproduction on the South Fork Flathead drainages make evaluation of this situation questionable.

Reproduction

Harlequins were present this year on at least 11 streams in the study area (not including Glacier National Park) and adult females or broods were seen on 8 of those streams. A minimum of 35 adult females were present. Late-July to early-August brood size on all streams averaged 4.00 ($n=10$). This was higher than in 1992 (3.27) or 1993 (2.81). Most broods were seen in Class III or fledged stages of development (Bellrose 1976:27), and we made no adjustment for age of broods in our calculation of mean brood size.

We identified 30 individual females on streams during spring and summer surveys. In addition, 5 females were identified during summer surveys where no spring surveys were conducted. Of 30 potential broods on streams surveyed both in spring for pairs and summer for broods, a minimum of 10 broods were produced for a 33% success rate of broods per adult female (Table 1). From 1989 to 1994 (Table 2), the success rate averaged 44.8% (range = 24-55%; $n = 230$ pairs on 35 streams). In 1994, the differences in numbers of young produced between the South Fork Flathead drainage (50) and other drainages (17 plus ?? in Glacier

National Park) were large. Annual differences in success rates from 1989-1992 were primarily associated with the amount and timing of runoff. High runoff, particularly in June-early July, and runoff in years with "double peaks" caused lower reproductive success. This was particularly evident in 1991 (Reichel and Genter 1994) the only year where runoff exceeded 20,000 cfs and when production was lowest (24%). The changes in reproductive success were primarily due to changes in numbers of broods per pair, not changes in the size of successful broods. This indicated that differences in mortality were due to events that affected entire clutches or very young broods during that time period. This pattern was not evident in the 1994 season. The runoff was not particularly high, nor did it have a pronounced double peak. There were no obvious differences between runoff patterns on the South Fork Flathead drainages vs Middle Fork, North Fork, or Lower Clark Fork where success rates were very low. While rates are not statistically comparable because pair counts were not on 2 of 4 South Fork drainage streams surveyed for broods, differences appeared large in both number of broods and brood sizes. It seems apparent that our understanding of factors contributing to the success or failure of harlequin reproduction is still far from complete.

Capture and Marking

We continued to make progress during the third year of the juvenile Harlequin Duck site fidelity and survival study. A total of 19 juvenile birds from 5 drainages were captured and marked (Table 3, Appendix D). Seven adult males and 7 adult females were also marked in 1994 (Table 3, Appendix D). This is a lower number than 1992 or 1993 due to a combination of: 1) low reproduction on many streams, 2) many adults present were marked in previous years, and 3) difficulty capturing some broods.

Relocation of Marked Birds

Table 4 lists when and where adults were marked and relocated, and if other ducks were present at the time; this does not include birds from Glacier National Park which are reported by Ashley (1994a, 1994b). One additional marked female was seen on the Spotted Bear River, but the markers not seen well enough to identify the individual. Of 6 adult birds marked in 1991 with nasal markers, 5 have been seen in subsequent years; however, 2 males not seen in 1992 were relocated in 1993, and 1 male not seen either in 1992 or 1993 was recaptured in 1994; at least 3 of the 6 were still alive in 1994. Of 11 adult birds marked with nasal discs in 1992, 6 were relocated in 1993 and 2 in 1994. Of 13 adult birds marked in 1993, 6 were relocated in 1994. Preliminarily, these numbers seem low; data will be fully analyzed when more data becomes available following the 1995 season.

A total of 62 juveniles were marked in 1992, 40 in Glacier National Park, 4 on Trail Creek, 7 on the Spotted Bear River, and 11 on Marten Creek. Young birds are thought to spend their first summer on the ocean, migrating to the breeding grounds as two-year-olds. Nine two-year-olds were seen in 1994, 8 females on McDonald Creek (Ashley 1994b) and 1 female on Trail Creek. All were on their natal streams, and only the female on Trail Creek successfully raised young.

In Grand Teton National Park, of all birds marked as juveniles only females have returned to the park (Rick Wallen, pers. comm.), and 2 females of 5 juveniles banded in Glacier National Park in 1974 returned in 1976 (Kuchel 1977). The evidence is mounting that only females return to their natal streams, while males go elsewhere to breed. This makes sense from an evolutionary perspective, reducing the chances of inbreeding and its associated problems. We do not know, however, if most or all females return to their natal streams.

Movements

Two movements of note were detected in 1994. Two Harlequins marked on McDonald Creek, Glacier National Park were recaptured or relocated along the southeastern coast of Vancouver Island in August 1994. On 11 August 1994 a male (765-27577), marked as juvenile exactly two years earlier, was captured at Shelter Point on the coast south of the Cambell River. The bird was molting but appeared healthy and the following measurements were taken: weight: 620 g; wing: 115 mm; tarsus: 37.1 mm; culmen (ml): 27.4 mm; Molt 2b. One white plastic leg band was missing and the two original color bands remaining were faded and removed. Green plastic band with white alpha-numeric 7G was placed on the right leg (metal band remained on left). On 6 August 1994, a male (755-76063), marked as an adult male 7 May 1993, was captured at Heron Rocks, Hornby Island, Straits of Georgia; this male was captured at the same location 4 Aug 1993 (Reichel and Genter 1994). The bird appeared healthy and the following measurements were taken: weight: 640 g; wing: 115 mm; tarsus: 37.8 mm; culmen (ml): 27.6 mm; Molt 2a. The orange plastic leg band on the right leg was missing, while the metal band on that leg, and the green and orange bands on the left leg, remained in place.

Table 1. Harlequin Duck reproduction in 1994 for streams with both pair and brood (at fledging) information.

<u>Stream</u>	<u>#Adult ♀♀</u>	<u>#Broods</u>	<u>#Young</u>
North Fork Flathead Drainage			
Big Creek	1	0	0
Trail Creek	4	2	4
Drainage Total	5	2	4
0.40 Broods per adult female			
0.80 Young per adult female			
2.00 Young per brood			
=====			
Lower Clark Fork Drainage			
Marten Creek	5	0	0
Rock Creek	4	1	3
Vermilion River	2	1	6
Drainage Total	11	2	9
0.18 Broods per adult female			
0.82 Young per adult female			
4.50 Young per brood			
=====			
Other			
Grave Creek	5	1	4
Spotted Bear River	3	3	11
Sullivan Creek	2	2	12
Swift Creek	3	0	0
Other Total	14	6	27
0.43 Broods per adult female			
1.93 Young per adult female			
4.50 Young per brood			
=====			
GRAND TOTAL	30	10	40
0.33 Broods per adult female			
1.33 Young per adult female			
4.00 Young per brood			

Table 2. Harlequin Duck reproductive parameters 1988-1994.

Year	# adult females	# broods	# young	broods per ad. female	young per ad. female	young per brood
1989	13	7	41	54%	3.15	5.86
1990*	31	17	65	55%	2.10	3.82
1991*	37	9	31	24%	0.84	3.44
1992*	71	39	132	55%	1.37	3.38
1993	48	21	59	44%	1.23	2.81
1994	30	10	40	33%	1.33	4.00
Total	230	103	368			
Mean				44.8%	1.60	3.57

* includes data from the Rocky Mountain Front (Diamond and Finnegan 1992, 1993)

Table 3. Summary of harlequin ducks marked in 1994.

<u>Location</u>	<u>Male</u>	<u>Female</u>	<u>Juv.</u>	<u>Total</u>
McDonald Creek, Glacier NP	1	2	1	4
Trail Creek, Flathead Co.		1	3	4
Grave Creek, Lincoln Co.		1	4	5
Sullivan Creek, Flathead Co.			6	6
Vermilion River, Sanders Co.			5	5
Marten Creek, Sanders Co.	3	1		4
<u>Rock Creek, Sanders Co.</u>	3	2		5
TOTAL	7	7	19	33

Table 4. Sightings and recaptures in Montana of adult Harlequins marked in Montana 1991-1993 and adult females marked in spring 1994.

Stream/Bird	Sex	1991		1992		1993		1994	
		Spr	Sum	Spr	Sum	Spr	Sum	Spr	Sum
Marten Creek									
765-27556	♀	w/d27555		w/d'	w/4j	w/4j	w/4j	w/d09302	not seen
765-27559	♀	w/d27560		seen	w/4j	w/1j	not seen	not seen	not seen
755-76007	♀				w/4j	w/1j*	not seen	not seen	not seen
755-76011	♀				w/d	not seen	w/d	not seen	not seen
755-76074	♀				w/d	w/d	w/d	w/d38624	not seen
755-76095	♀				w/d	w/4j	w/d	w/d	not seen
925-09303	♀				w/d	w/4j	w/d	w/d09304	not seen
765-27555	♂	w/f27556							
765-27560	♂	w/f27559							
765-27557	♂	w/d27558							
765-27558	♂	w/d27557							
765-27561	♂								
755-76075	♂								
755-76076	♂								
755-76078	♂								
Vermilion River									
755-76079	♀			w/4j		w/4j		w/6j	
755-76086	♀			w/2j		w/2j		not seen	
765-27562	♂								
Rock Creek									
755-76097	♀								
925-09305	♀								
925-09309	♀								
Trail Creek									
755-76045	♀			w/4j		w/3j		not seen	
765-27564	♀	w/d27563		w/4j	w/27563	not seen	not seen	not seen	
765-27566	♀	w/d27565		not seen	w/d27565	not seen	not seen	not seen	
775-38617	♀				w/5j	w/76073	not seen	not seen	
Spotted Bear River									
765-27596	♀			w/3j		not seen	not seen	not seen	??w/5j

?? = not certainly this bird (colors not seen clearly)

** Seen on Swamp Creek

MANAGEMENT RECOMMENDATIONS AND RESEARCH NEEDS

Adult Harlequins show strong fidelity to breeding sites (Bengtson 1972, Kuchel 1977, Dzinbal 1982, Wallen 1987, Reichel and Genter 1994). The extent of fidelity to natal areas by adults breeding for the first time is unknown, but is likely to be strong. Colonization of currently unoccupied streams is likely to be a rare event. Harlequins appear sensitive to human disturbance (Clarkson 1992, Cassirer and Groves 1991). Repeated disturbances may discourage nesting at traditional sites and reduce productivity (Rodrick and Milner 1991). However, proximity to trails and roads does not always correlate with reduced reproductive success. Sixty percent of Harlequin sites were within 50 m of trails on the Rocky Mountain Front (Diamond and Finnegan 1992). In this case, most Harlequin streams are located in roadless or wilderness areas and receive limited human activity prior to or during the nesting period.

Mid-stream loafing sites are important in breeding areas (Cassirer and Groves 1990). Brood rearing areas in Idaho and Montana west of the Continental Divide typically have a dense shrub or timber/shrub mosaic on the banks (Cassirer and Groves 1989, Gangemi 1991). East of the Divide in Montana stream banks are more open, and most observation sites had banks composed of gravel, grass-forb, or bedrock habitat (Diamond and Finnegan 1992, Markum and Genter 1990). Low benthic macroinvertebrate biomass may limit the number and productivity of Harlequins (Bengtson and Ulfstrand 1971, Kuchel 1977). A Harlequin Duck Conservation Strategy is currently being written for the Northern Rocky Mountains and a draft should be available in spring of 1995. It will include management recommendations, monitoring and surveying protocols, and, research priorities. In the interim, we recommend the following management strategies on Harlequin streams:

- 1) minimize unnecessary human activity along Harlequin Duck nesting streams during late April through August;
- 2) a stream buffer of > 50 m should be maintained for most activities; roads and trails should be > 100 m from streams and preferably not visible from the streams;
- 3) major activities (road building, timber harvest, fisheries enhancements, restoration projects, etc.) that are to be undertaken within 300 m of a stream should be done during the period 15 August - 1 April;
- 4) minor activities within stream buffers (e.g. trail maintenance or reconstruction) should not be preformed during 1 May - 15 July;
- 5) avoid activities which will change stream runoff patterns or decrease water quality;
- 6) in any area where major management activities are to take place in potential Harlequin habitat, survey for the preceding two years both for pairs (May) and broods (mid-July to mid-August). If Harlequins are present, develop a monitoring plan for Harlequins during and after the activity is to take place.

Long term research and management needs involve:

- 1) develop a baseline status report of current and historic Harlequin populations in Montana (currently in preparation);
- 2) investigate site fidelity, inter-stream movement, reproduction and mortality to allow estimations and modeling of what constitutes a viable Harlequin population (began in 1992);

- 3) determining the primary limiting factors for Harlequin Duck populations in occupied and historic habitat situations in the Northern Rockies;
- 4) developing standardized surveying and monitoring protocols for occupied and potential Harlequin Duck nesting streams (currently in preparation);
- 5) developing management guidelines for maintaining Harlequin populations and habitat (currently in preparation); and
- 6) assess the impacts of past and current habitat modification and develop techniques to restore Harlequin populations and habitat.

LITERATURE CITED

- American Ornithologists' Union. 1983. Check-list of North American birds, 6th edition. Allen Press, Lawrence, Kans. 877 pp.
- Ashley, J. 1992. A summary of documented harlequin duck observations in Glacier National Park, 1874-1992. Unpubl. Report, Glacier Natl. Park, West Glacier, Mont. 19 pp.
- Ashley, J. 1994a. 1992-93 Harlequin duck monitoring and inventory results in Glacier National Park, Montana. Unpubl. Report, Glacier Natl Park, West Glacier, Montana. 57 pp.
- Ashley, J. 1994b. Progress report: Harlequin duck inventory and monitoring in Glacier National Park, Montana. Unpubl. Report, Glacier Natl Park, West Glacier, Montana. 14 pp.
- Bellrose, F. C. 1976. Ducks, geese and swans of North America. Stackpole Books, Harrisburg, Penn. 540 pp.
- Bengtson, S.A. 1966. Field studies on the harlequin duck in Iceland. Wildfowl Trust Ann. Rep. 17:79-94.
- Bengtson, S.A. 1972. Breeding ecology of the harlequin duck *Histrionicus histrionicus* (L.) in Iceland. Ornis Scand. 3:1-19.
- Bengtson, S.A. and S. Ulfstrand. 1971. Food resources and breeding frequency of the harlequin duck, *Histrionicus histrionicus*, in Iceland. Oikos 22:235-239.
- Carlson, J. C. 1990. Results of harlequin duck (*Histrionicus histrionicus*) surveys in 1990 on the Flathead National Forest, Montana. Mont. Nat. Heritage Prog., Helena. 32 pp.
- Cassirer, E. F., A. Breault, P. Clarkson, D.L. Genter, R. I. Goudie, B. Hunt, S. C. Latta, G. H. Mittelhauser, M. McCollough, G. Schirato, and R. L. Wallen. 1993. Status of harlequin ducks (*Histrionicus histrionicus*) in North America. Report of the Harlequin Duck Working Group. 83 pp.
- Cassirer, E. F. and C. R. Groves. 1989. Breeding ecology of harlequin ducks (*Histrionicus histrionicus*) on the Kaniksu National Forest, Idaho. Idaho Dept. Fish Game, Nongame Endangered Wildl. Prog. 48 pp.
- Cassirer, E. F. and C. R. Groves. 1990. Distribution, habitat use, and status of harlequin ducks in northern Idaho, 1990. Idaho Dept. Fish Game, Nongame Endangered Wildl. Prog. 54 pp.
- Cassirer, E. F. and C. R. Groves. 1991. Harlequin duck ecology in Idaho: 1987-1990. Idaho Dept. Fish Game, Nongame Endangered Wildl. Prog. 93 pp.

- Clarkson, P. 1992. A preliminary investigation into the status and distribution of harlequin ducks in Jasper National Park. Unpubl. Tech. Rep. Heritage Resource Conservation, Jasper National Park. 65 pp.
- Diamond, S. and P. Finnegan. 1992. Harlequin duck ecology on Montana's Rocky Mountain Front. USDA, Lewis and Clark Natl. For., Rocky Mountain Ranger Dist., Choteau, MT. 45 pp.
- Diamond, S. and P. Finnegan. 1993. Harlequin duck ecology on Montana's Rocky Mountain Front. USDA, Lewis and Clark Natl. For., Rocky Mountain Ranger Dist., Choteau, MT. 73 pp.
- Dzinbal, K. A. 1982. Ecology of harlequin ducks in Prince William Sound, Alaska during summer. Unpubl. M.S. Thesis, Ore. State Univ., Corvallis. 89 pp.
- Fairman, L. and G. Miller. 1990. Results of the 1990 survey for harlequin ducks (*Histrionicus histrionicus*) on the Kootenai National Forest, Montana and parts of the Lolo National Forest, Montana. Mont. Nat. Heritage Prog., Helena. 41 pp.
- Gangemi, J. T. 1991. Results of harlequin duck (*Histrionicus histrionicus*) surveys on the non-wilderness portion of the Flathead National Forest, Montana. Mont. Nat. Heritage Prog., Helena. 29 pp.
- Genter, D.L. 1993. Harlequin duck status report 1992: Montana. pp.31-34 in E. F. Cassirer et. al, Status of harlequin ducks (*Histrionicus histrionicus*) in North America. Report of the Harlequin Duck Working Group. 83 pp.
- Goudie, R. I. 1993. Harlequin duck status report: eastern Canada. pp 65-74 in E. F. Cassirer et. al, Status of harlequin ducks (*Histrionicus histrionicus*) in North America. Report of the Harlequin Duck Working Group. 83 pp.
- Kerr, R. 1989. Field survey summary report of the harlequin duck (*Histrionicus histrionicus*) of the Kootenai National Forest, Montana. Unpubl. Rep. 10 pp.
- Kuchel, C. R. 1977. Some aspects of the behavior and ecology of harlequin ducks breeding in Glacier National Park, Montana. M.S. Thesis, Univ. Mont., Missoula. 156 pp.
- Markum, D. and D. L. Genter. 1990. Preliminary report on the distribution and status of the harlequin duck (*Histrionicus histrionicus*) on the Gallatin National Forest, Montana. Montana Natural Heritage Program. Helena. Unpubl. Rep. 22 pp.
- Miller, V. E. 1988. Harlequin duck (*Histrionicus histrionicus*): 1988 results of field surveys in west-central, Montana. Unpubl. rep. 13 pp.

Miller, V. E. 1989. 1989 field survey report: harlequin duck (*Histrionicus histrionicus*), Lower Clark Fork River drainage, west-central, Montana. Unpubl. rep. on file Mont. Nat. Heritage Prog., Helena. 48+ pp.

Moseley, R. and C. Groves. 1990. Rare, threatened and endangered plants and animals of Idaho. Unpubl. Rep., Nat. Heritage Sect., Nongame and Endangered Wildl. Prog., Idaho Dept. Fish Game, Boise. 33 pp.

Reel, S., L. Schassberger, and W. Ruediger. 1989. Caring for our natural community: Region 1 - Threatened, Endangered & Sensitive Species Program. USDA, For. Serv. N. Region, Missoula, MT. 309 pp. + appendices

Reichel, J. D. and D. L. Genter. 1993. Harlequin duck surveys in western Montana: 1992. Montana Natural Heritage Program, Helena. 67 pp.

Reichel, J. D. and D. L. Genter. 1994. Harlequin duck surveys in western Montana: 1993. Montana Natural Heritage Program, Helena. 87 pp.

Rodrick, E. and R. Milner. 1991. Management recommendations for Washington's priority habitats and species. Wash. Dept. Wildl., Olympia.

U.S. Department of Interior. 1991. Endangered and Threatened Wildlife and Plants; Animal Candidate Review for Listing as Endangered or Threatened Species, Notice of Review. Federal Register 56 (225):58804-58836.

Wallen, R. L. 1987. Habitat utilization by harlequin ducks in Grand Teton National Park. Unpubl. M.S. Thesis, Mont. State Univ., Bozeman. 67 pp.

APPENDICES

Appendix A. Streams surveyed for Harlequin Ducks in 1994.

Stream & Segment	Date	kms	Harlequins					
			M	F	J	U	Pr	Br
Kootenai National Forest								
Big Creek (T34N, R30W, S20 to T34N, R29W, S3)	7 May	18						
Grave Creek (T36N, R25W, S22 to T37N, R24W, S32)	8 May	8						
T35N, R26W, S12 to T36N, R25W, S11	31 Jul	12	1	4			3	1
T36N, R25W, S14 to T37N, R24W, S32	1 Aug	6		1				
Marten Creek (T25N, R32W, S32 to T25N, R33W, S27)	4 May	9	3					5
S. Fork T24N, R33W, S11 to T25N, R32W, S31)	4 May	4	1					
T25N, R32W, S32 to T25N, R33W, S26	29 Jul	6						
S. Fork (T24N, R33W, S11 to T25N, R32W, S31)	29 Jul	3						
Rock Creek (T26N, R32W, S28 to S10)	5 May	10	1				3	
T26N, R32W, S29 to S2	28 July	14	1	3			1	
Swamp Creek (T25N, R31W, S3 to T25N, R32W, S14)	6 May	16	1					
Vermillion R. (T24N, R31W, S14 to T24N, R29W, S15)	3 May	22	1				2	
T24N, R31W, S14 to T25N, R29W, S1	29-30 Jul	15	1	6			1	
Wigwam Creek (T37N, R25W, S16 to S10)	6 June	4						
Helena National Forest								
Landers Fork of the Blackfoot River								
T16N, R8W, S27 to T14N, R8W, 12	14 July	20						
Lolo National Forest								
Monture Creek (T17N, R12W, S32 to T16N, R12W, S20)	13 July	12						
North Fork Blackfoot River								
T17N, R10W, S31 to T16N, R11W, S12	15 Jul	6						



Table 1. (cont.) Streams surveyed for Harlequin Ducks in 1994.

Stream	Date	kms	M	F	J	U	Pr	Br	Harlequins
Stillwater State Forest									
Stillwater River (T34N, R24W, S5 to S17)	6 June	4							
T34N, R24W, S17 to T34N, R25W, S25	25 May	8							
Swift Creek (T33N, R23W, S3 to T33N, R23W, S24)	11 May	8	1						
T33N, R23W, S24 to T31N, R22W, S5	23 May	20	3	1					
T33N, R22W, S30 to T31N, R22W, S5	10 Aug	18							
Flathead National Forest									
Big Creek (T33N, R20W, S30 to S22)	19 May	6							
T33N, R21W, S33W to T33N, R20W, S30	3 June	15							1
T33N, R21W, S33W to T33N, R20W, S22	2-3 Aug	21							
Bunker Creek (T24N, R15W, S26 to T24N, R14W, S20)	26 May	8							
Canyon Creek (T32N, R20W, S29 to T32N, R20W, S27)	4 June	5							
Coal Creek (T34N, R21W, S28 to S36)	8 Jun	8							
T34N, R21W, S36 to T34N, R20W, S20	13 May	7							
Little Salmon (T22N, R15W, S20 to T22N, R14W, S23)	21, 24-5 Jul	24	1	7					1
Spotted Bear (T25N, R14W, S14 to T25N, R15W, S17)	27 May	16							2
T25N, R13W, S22 to T25N, R15W, S17	6 Aug	25	2	9	3				3 (2, 4, 5)
Sullivan Creek (T26N, R16W, S32 to T26N, R17W, S1)	9 June	15							
T26N, R16W, S31 to T27N, R17W, S36	5 Aug	15	2	12					2 (5, 7)
Trail Crk (T37N, R23W, S36 to T37N, R22W, S36)	9 May	22	6						3
T36N, R23W, S6SWNW to T26N, R22W, S36	1-2 Aug	28	2	4					2 (3, 1)
Upper Twin Crk (T26N, R15W, S22 to T26N, R16W, S25)	27 May	9							
White River (T22N, R13W, S24 to T21N, R13W, S8)	22-23 Jul	20	4	20					4 (1, 6, 6, 7)

**Appendix B. Miscellaneous reports of Harlequin Ducks during 1994
and reports for prior years received during 1994**



Appendix B. Miscellaneous reports of Harlequin Ducks during 1994 and reports for prior years received during 1994.

Stream & Location	Date	Harlequins						Observer
		M	F	J	U	Pr	Br	
Kootenai National Forest								
Elk Creek	26 April 94			1	2		1	J.K. Werner
East Fork T26N,R34W,S21 NW4	15 May 94			1				J.K. Werner
Grave Creek (T36N,R25W,S14 NW4NW4)								
Lolo National Forest								
North Fork Blackfoot River, $\frac{1}{2}$ mile above N. Fork Cabin	1 June 94						1	John Nichols
reported pair present with nest of 5 eggs (report did not come in until mid-July)								
Glacier National Park								
Avalanche Lake	6 June 94				1			Roy Arscott
McDonald Creek	12 Sept 94			5				Judy Hoy
($\frac{1}{2}$ mi above Avalanche Ck Campground)								
IDAHO								
Moyle River	7 May 94				5			Jill Davies
WYOMING								
Shell Creek Canyon	1978		x	x				John McGough
								has not seen any in the last 10 years there

Appendix C. Data forms

Harlequin Duck Survey Form. ____ of ____

Date _____ Time _____ Surveyor(s) _____
(Start/Finish)

Stream _____
Include map with exact area(s) surveyed on back of this page

Weather _____
(Temp., wind dir & speed, cloud cover, precip last 24 hrs)

Accessibility? _____

Group # _____ # Individuals _____
(Put on map)

Sexes & Ages _____

Marked? _____

Accessibility? _____

Group # _____ # Individuals _____
(Put on map)

Sexes & Ages _____

Marked? _____

Accessibility? _____

Group # _____ # Individuals _____
(Put on map)

Sexes & Ages _____

Marked? _____

Accessibility? _____

NOTES:

Harlequin Duck Banding Form.

Date _____ Location _____

Sex ____ Age ____ T ____ N, R ____ W, Section _____
Nasal Saddles Color Bands
Band # _____ Lft _____ Rt _____ Lt _____ Rt _____

Weight _____ Wing chord _____ Tail _____ Tarsus _____

Molt _____

Notes _____
(with other ducks? marked, sex, age? etc.)

+++++

Date _____ Location _____

Sex ____ Age ____ T ____ N, R ____ W, Section _____
Nasal Saddles Color Bands
Band # _____ Lft _____ Rt _____ Lt _____ Rt _____

Weight _____ Wing chord _____ Tail _____ Tarsus _____

Molt _____

Notes _____
(with other ducks? marked, sex, age? etc.)

+++++

Date _____ Location _____

Sex ____ Age ____ T ____ N, R ____ W, Section _____
Nasal Saddles Color Bands
Band # _____ Lft _____ Rt _____ Lt _____ Rt _____

Weight _____ Wing chord _____ Tail _____ Tarsus _____

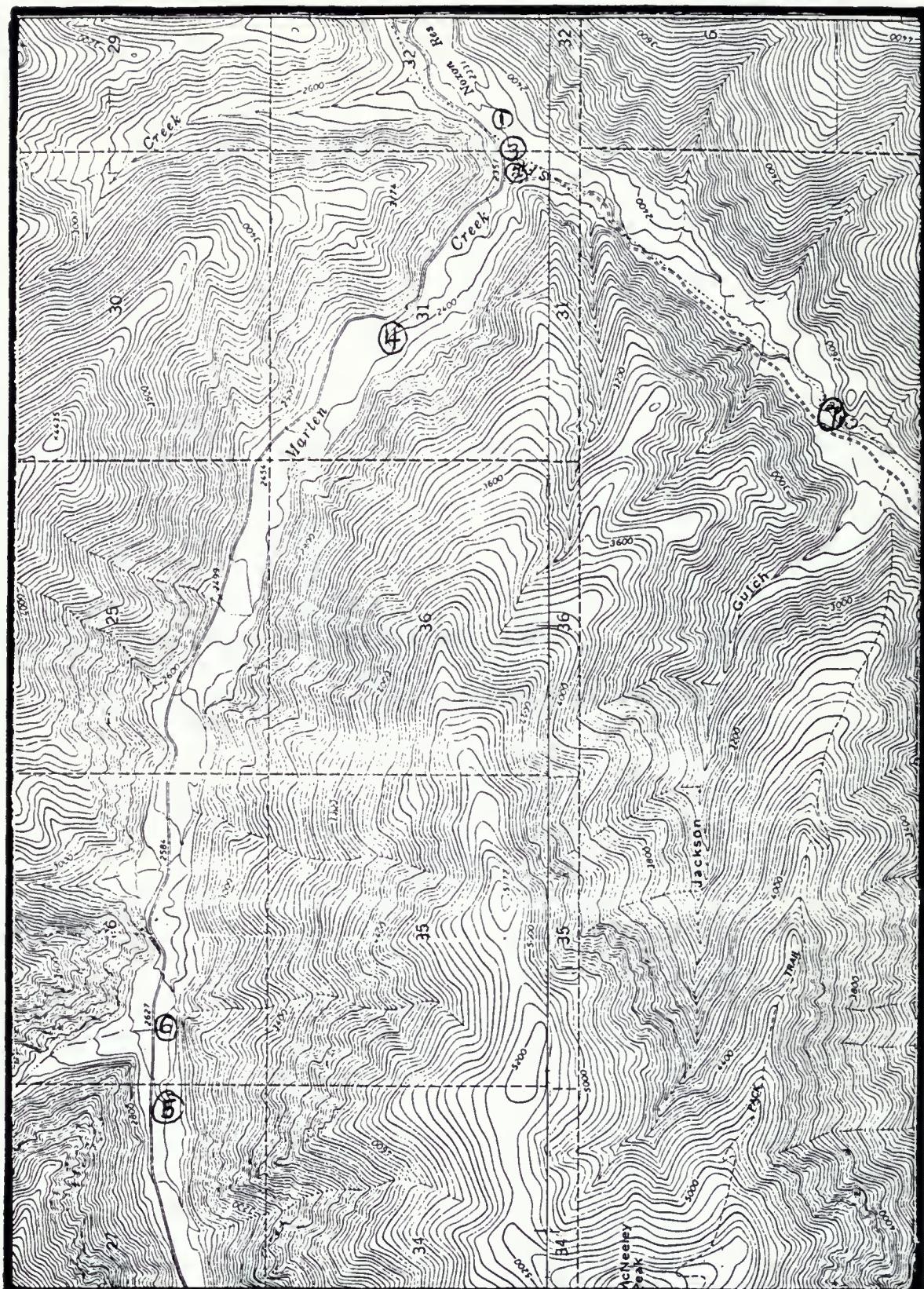
Molt _____

Notes _____
(with other ducks? marked, sex, age? etc.)

+++++

NOTES:

**Appendix D. List of Harlequin Ducks marked in 1994
or marked in previous years and sighted in 1994.**



Marten Creek Harlequin Duck marking sites
USGS quad: Bloom Peak & Noxon

Appendix D. List of Harlequin Ducks marked in 1994 or marked in previous years and sighted in 1994.

Harlequin Duck marking outside Glacier National Park utilizing nasal discs and USFWS bands.

C = Circle	red = red	yel = yellow
T = Triangle	grn = green	blk = black
S = Square	blu = blue	wht = white
	ora = orange	

Marten Creek, Kootenai National Forest, Sanders Co., MT

Site	USFWS Band #	Nasal Discs	
		left	right
1) 4 May 94			
** Adult Female	755-76011	T-yel	T-grn
marked 4 Aug 92 with 4 juveniles; paired with unmarked male			
** Adult Male	755-76076	C-grn	S-ora
marked 26 May 93 with one unmarked male			
2) 4 May 94			
** Adult Male	?	T-yel	?
(probably 765-27558 seen later at site 4)			
3) 4 May 94			
** Adult Female	755-76095	S-ora	T-yel
-caught 29 Jul 93 with brood of 4 chicks)			
4) 4 May 94			
** Adult Male	765-27558	T-yel	T-yel
-caught 29 May 91 with adult male 765-27557)			
Adult Male	775-38624	C-blu	C-grn
** Adult Female	755-76074	C-grn	C-whi
(marked 26 May 93 with adult male 755-76078)			
Adult Male	925-09302	C-blu	T-yel
** Adult Female	765-27556	T-blk	T-blk
-caught 15 May 91 with adult male 765-27555; had brood of 4 chicks 5 Aug 92)			
5) 4 May 94			

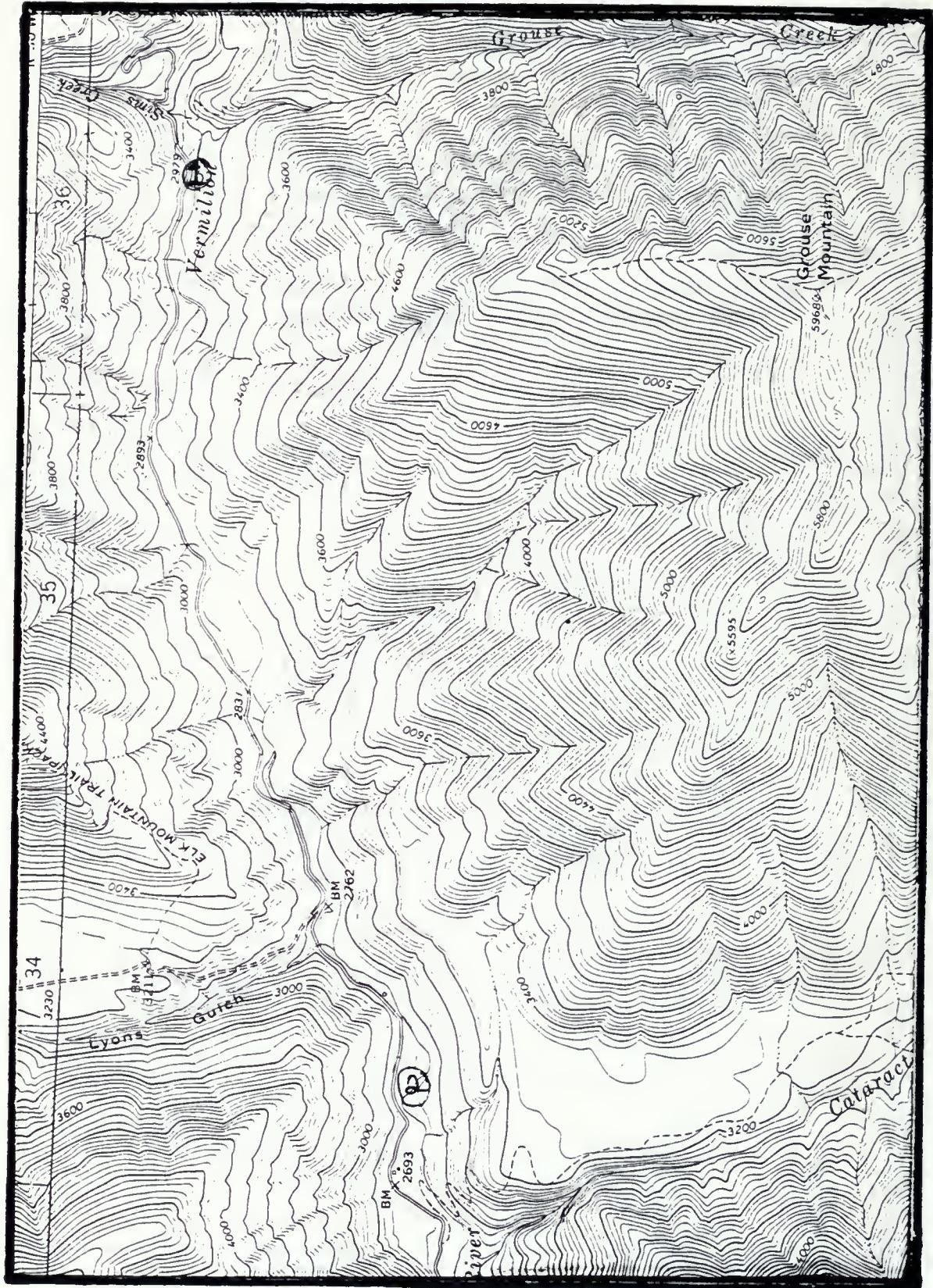
Adult Female	925-09303	C-blu	S-blu
Adult Male	925-09304	C-blu	S-blu

6) 4 May 94

** Adult Male 765-27560 S-ora S-ora
(caught with adult female 755-76018 on 30 May 91)

7) 4 May 94

** Adult Male 755-76076 C-grn S-ora
(with unmarked male; caught 26 May 93 with unmarked male)



Vermilion River Harlequin Duck marking sites
USGS quad: Seven Point Mountain

Appendix D (cont.)

Harlequin Duck marking outside Glacier National Park utilizing nasal discs and USFWS bands.

C = Circle	red = red	yel = yellow
T = Triangle	grn = green	blk = black
S = Square	blu = blue	wht = white
	ora = orange	

Vermilion River, Kootenai National Forest, Sanders Co., MT

1) 3 May 94

** Adult Female 755-76079 S-ora C-grn
with unmarked male; caught 28 July 93 with 4 young

2) 29 July 94

Juvenile	925-09311	T-yel	C-red
Juvenile	925-09312	T-blk	C-red
Juvenile	925-09313	S-grn	C-red
Juvenile	925-09314	C-blu	C-whi
Juvenile	925-09315	C-whi	C-blu
** Adult Female	755-76079	S-ora	C-grn

originally caught 28 July 93 with 4 young



Rock Creek Harlequin Duck marking sites
USGS quad: Elephant Peak & Noxon Rapids Dam

Appendix D (cont.)

Harlequin Duck marking outside Glacier National Park utilizing nasal discs and USFWS bands.

C = Circle	red = red
T = Triangle	grn = green
S = Square	blu = blue
	yel = yellow
	blk = black
	wht = white
	ora = orange

Rock Creek, Kootenai National Forest, Sanders Co., MT

1) 5 May 94

** Adult Female 755-76097 T-yel S-ora
with unmarked male; marked 31 July 93 with 4 young

2) 5 May 94

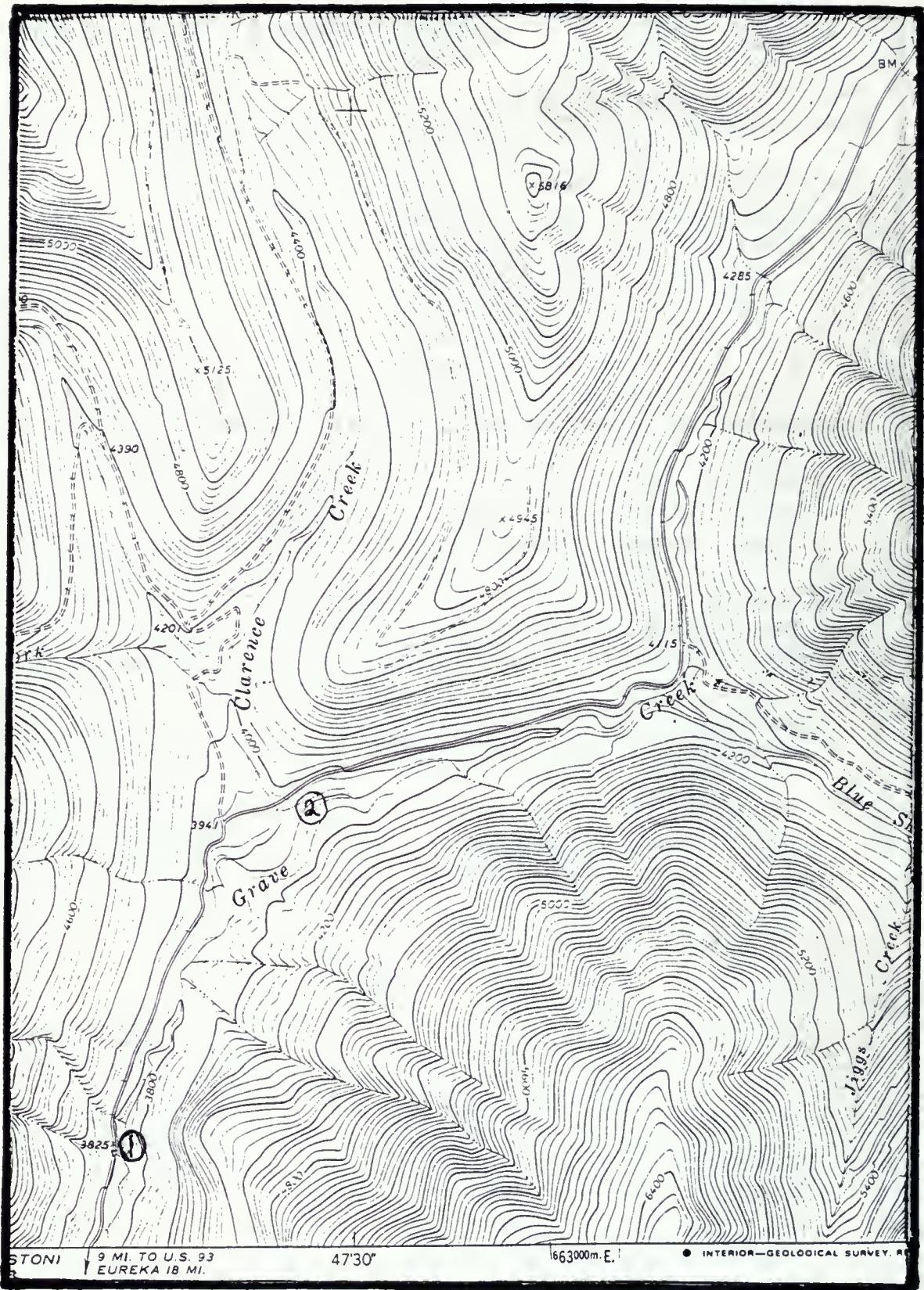
Adult Female	925-09305	S-blu	C-grn
Adult Male	925-09306	S-blu	C-grn

3) 5 May 94

Adult Male	925-09307	T-yel	C-grn
------------	-----------	-------	-------

4) 5 May 94

Adult Male	925-09308	S-blu	C-whi
Adult Female	925-09309	S-blu	C-whi



Grave Creek Harlequin marking sites
USGS quad: Stahl Peak

Appendix D (cont.)

Harlequin Duck marking outside Glacier National Park utilizing nasal discs and USFWS bands.

C = Circle red = red
T = Triangle grn = green
S = Square blu = blue
 yel = yellow
 blk = black
 wht = white
 ora = orange

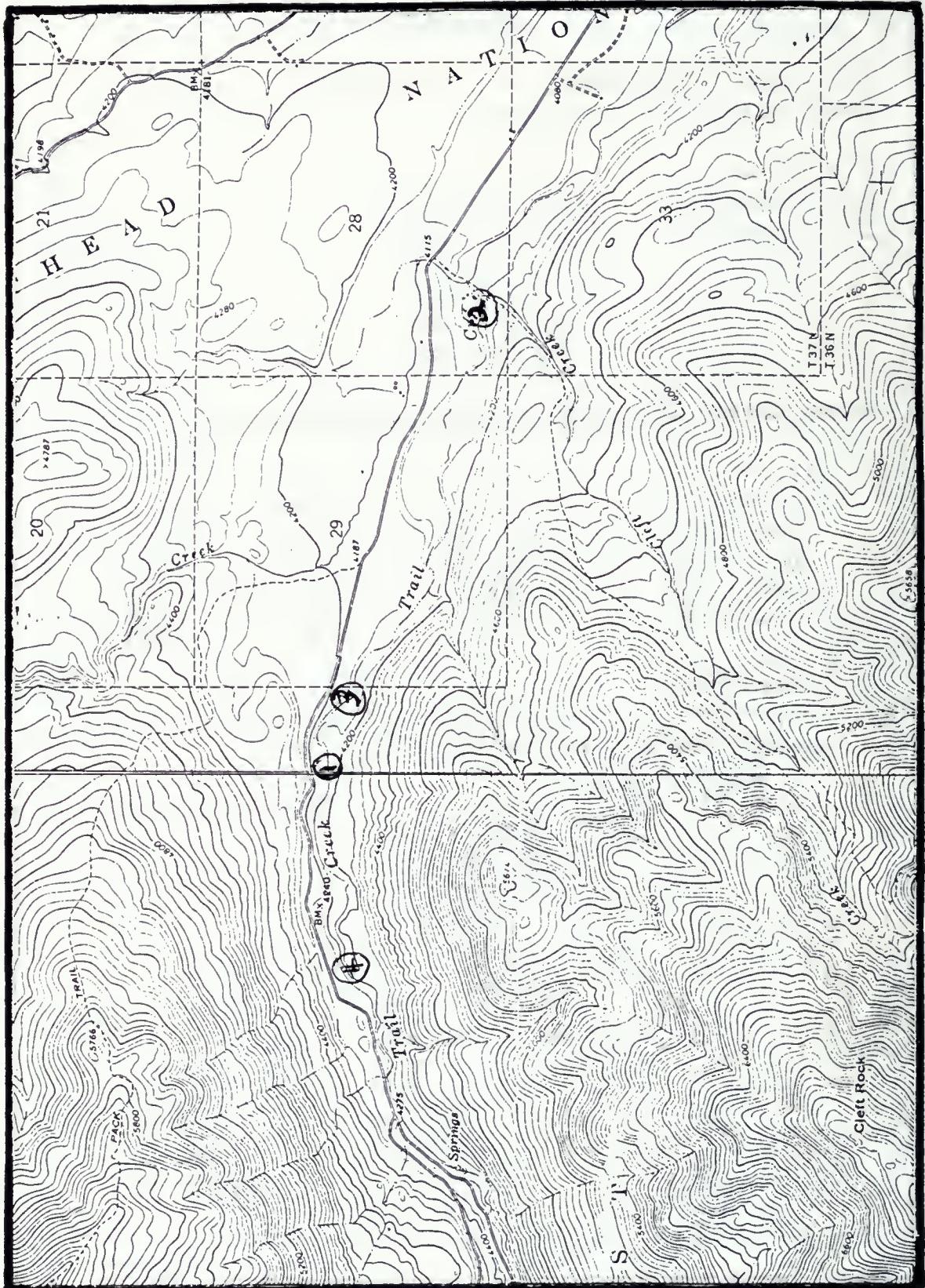
Grave Creek, Kootenai National Forest, Lincoln Co., MT

1) 31 July 94

Juvenile	925-09316	C-red	T-grn
Juvenile	925-09317	C-blu	C-red
Adult Female	925-09318	C-grn	C-blu
Juvenile	925-09319	no discs	
Juvenile	925-09320	T-grn	C-red

2) 1 Aug 1994

** Juvenile 925-09319 no discs
sighting of bird marked 31 July 94



Trail Creek Harlequin Duck marking sites
USGS quad: Trailcreek & Mount Hefty

Appendix D (cont.)

Harlequin Duck marking outside Glacier National Park utilizing nasal discs and USFWS bands.

C = Circle	red = red	yel = yellow
T = Triangle	grn = green	blk = black
S = Square	blu = blue	wht = white
	ora = orange	

Trail Creek, Flathead National Forest, Flathead Co., MT

Nasal Disks

Site	USFWS Band #	left	right
------	--------------	------	-------

1) 9 May 94

** Adult Male 755-76073 S-blu S-blu
originally marked 9 May 93 with adult female 765-27566

2) 9 May 94

** Adult Male 765-27563 C-blu C-blu
originally marked 10 June 92 with adult female 765-27564
and seen again with her on 9 May 93

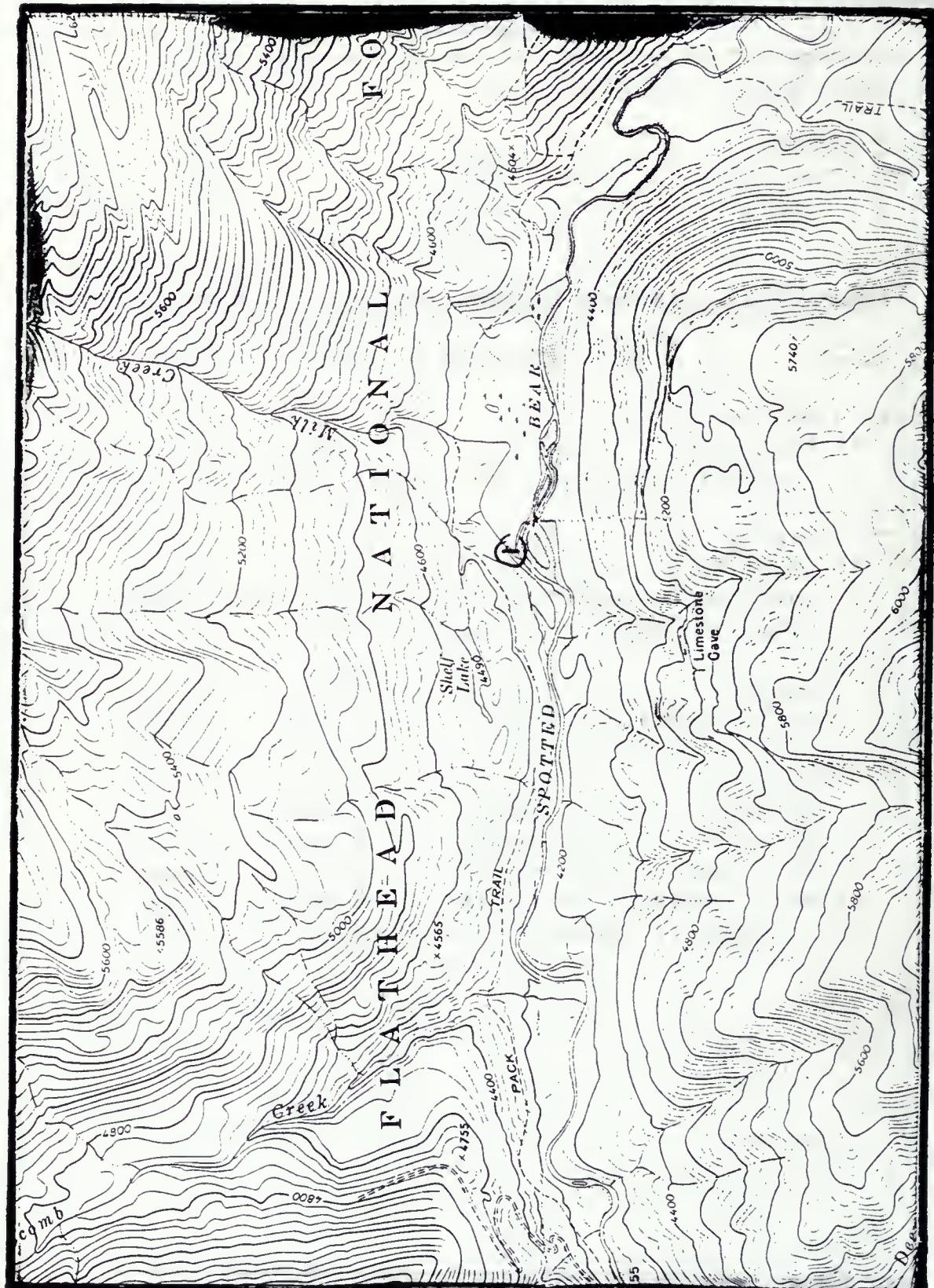
3) 1 Aug 94

Adult Female 925-09321 C-whi S-blu

4) 1 Aug 94

Juvenile	925-09322	S-ora	C-red
Juvenile	925-09323	S-grn	C-whi
Juvenile	925-09324	C-whi	S-grn
** Adult Female	755-76046	S-red	S-grn

originally captured as a juvenile 12 Aug 92



Spotted Bear River Harlequin Duck marking site
USGS quad: Whitcomb Peak

Appendix D (cont.)

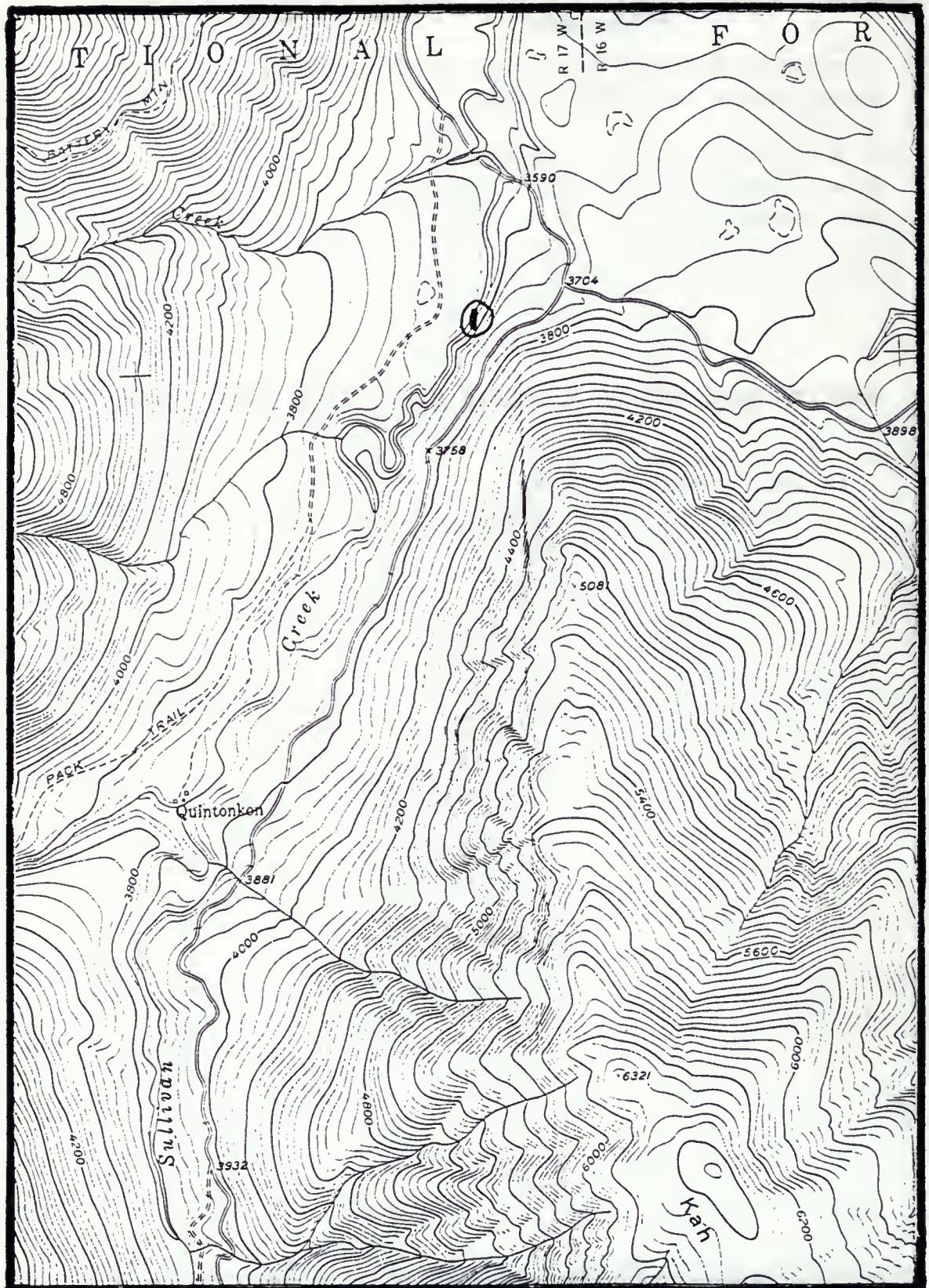
Harlequin Duck marking outside Glacier National Park utilizing nasal discs and USFWS bands.

C = Circle	red = red
T = Triangle	grn = green
S = Square	blu = blue
	yel = yellow
	blk = black
	wht = white
	ora = orange

Spotted Bear River, Flathead National Forest, Flathead Co., MT

1) 6 Aug 94

** Adult Female ???? C-red ??
marked in 1992, either an adult female or 1 of 7 juveniles



Sullivan Creek Harlequin Duck marking site
USGS quad: Quintonkon

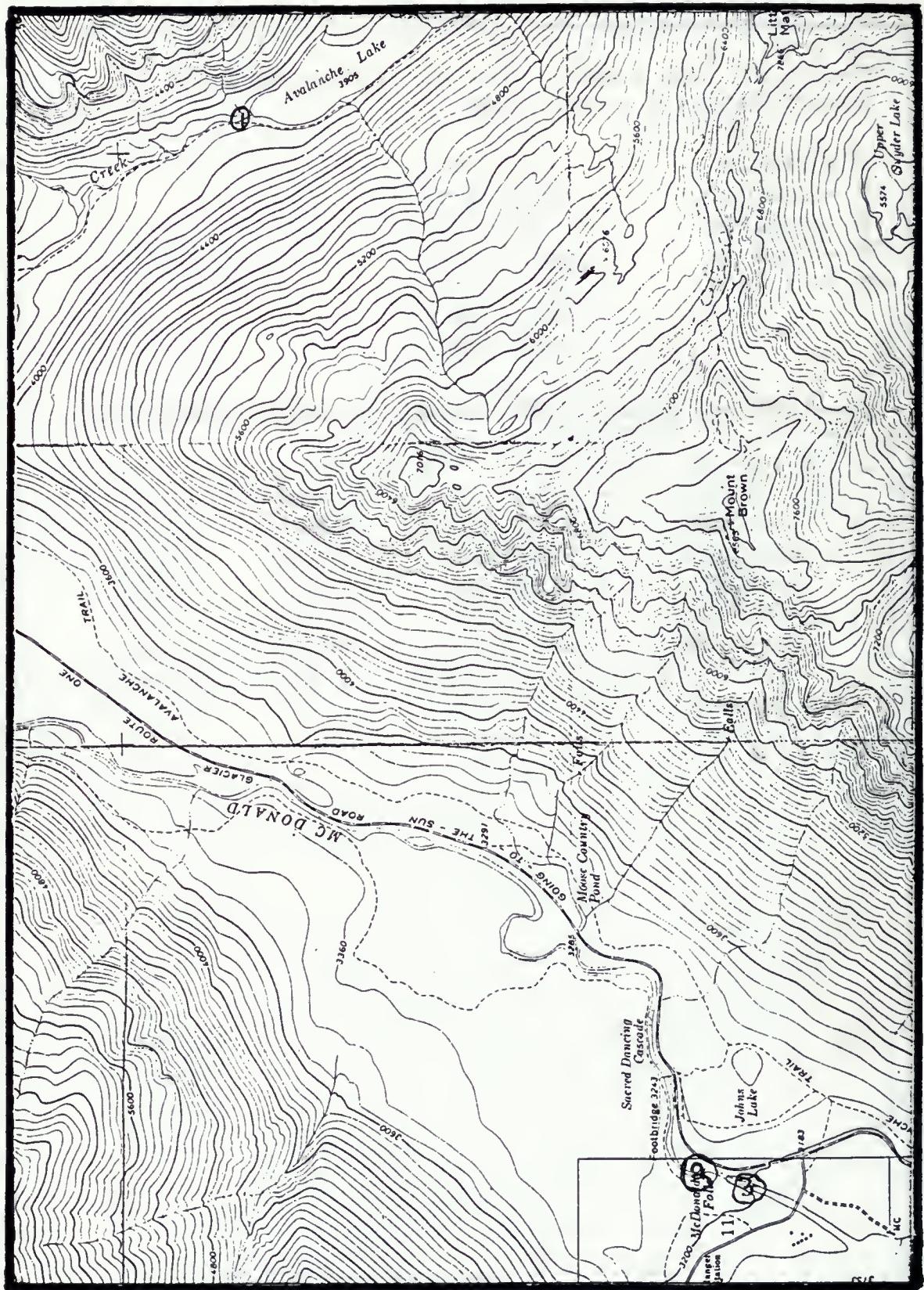
Appendix D (cont.)

Harlequin Duck marking outside Glacier National Park utilizing nasal discs and USFWS bands.

C = Circle	red = red
T = Triangle	grn = green
S = Square	blu = blue
O = Oval	yel = yellow
Y = Wishbone	blk = black
	wht = white
	ora = orange

Sullivan Creek, Flathead National Forest, Flathead Co., MT

- 1) 5 Aug 94
- | | | | |
|----------|-----------|-------|-------|
| Juvenile | 925-09327 | S-red | C-blu |
| Juvenile | 925-09328 | S-grn | S-blu |
| Juvenile | 925-09329 | S-blu | C-grn |
| Juvenile | 925-09330 | C-whi | T-blk |
| Juvenile | 925-09331 | C-grn | O-yel |
| Juvenile | 925-09332 | O-yel | C-grn |
- part of 2 broods of 5 and 7; 2 adult females were also present



Glacier National Park Harlequin Duck marking sites
USGS quad: Mount Cannon

Appendix D (cont.)

Colored Leg Bands used in Glacier National Park

p = pink (pink/USFWS for 1992 & 1993 juveniles)
r = red
g = green w = white
b = blue o = orange
y = yellow s = silver (FWS band)

Glacier National Park

Site	USFWS Band #	Plastic leg bands	
		left	right
1) 24 May 94			
Adult Male	925-09310	o/s	o/b
** Adult Female	755-76051	o/s	o/b
marked 10 Aug 92 with 2 young			
2) 4 Aug 94			
Adult Female	925-09325	y/s	y/b
Adult Female	925-09326	y/s	g/y
** Adult Female	755-76022	o/b	p/s
originally marked 10 Aug 92 as juvenile			
** Adult Female	755-76023		p/s
originally marked 10 Aug 92 as juvenile			
** Adult Female	755-76060	o/b	p/s
originally marked 6 May 93 with adult male (one additional adult female not captured)			
3) 19 Aug 94			
Juvenile Male	925-09333	o/s	o/p-32

Appendix E. Element Occurrence Records from 1994 Surveys

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Scientific Name: **HISTRIONICUS HISTRIONICUS**
Common Name: **HARLEQUIN DUCK**

Global rank: G4 Forest Service status: SENSITIVE
State rank: S2B, SZN Federal Status: C2

Element occurrence code: ABNJB15010.005

Element occurrence type:

Survey site name: ROCK CREEK (NOXON)

EO rank: D

EO rank comments: 2 PAIRS PRESENT IN 1993, FEWER IN PREVIOUS YEARS.
3-4 OTHER STREAMS WITHIN 20 KM WITH TOTAL OF 9-12
PAIRS; ACCESS DIFFICULT, NO BOATING AND LITTLE
FISHING.

County: SANDERS

USGS quadrangle: NOXON RAPIDS DAM
ELEPHANT PEAK

Township: Range: Section: TRS comments:
026N 032W 27 15.22

Precision: M

Survey date: **Elevation:** 2400 - 2680

First observation: 1986 Slope/aspect:

Last observation: 1994-07-28 Size (acres): 0

Location:

ABOUT 1.5 AIR MILES NE OF NOXON RAPIDS DAM, WHERE FOREST SERVICE ROAD #150 FIRST INTERSECTS ROCK CREEK.

Element occurrence data:

SPORADIC SIGHTINGS SINCE 1986; PROBABLY 1 OR 2 BROODS GENERALLY PRODUCED EACH YEAR. (SPECIFIC OBSERVATION DATA ON FILE AT MTNHP.)

General site description:

A CA. 3 MILE STRETCH OF MOUNTAIN STREAM, EXTENDING UPSTREAM FROM MAPPED LOCATION.

Land owner/manager:

KOOTENAI NATIONAL FOREST, CABINET RANGER DISTRICT
PRIVATELY OWNED LAND (INDIVIDUAL OR CORPORATE)

Comments:

FISH TRAP PLACED BY MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS.

Information source:

Specimens:



MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Scientific Name: **HISTRIONICUS HISTRIONICUS**
Common Name: **HARLEQUIN DUCK**

Global rank: G4 Forest Service status: SENSITIVE
State rank: S2B, SZN Federal Status: C2

Element occurrence code: ABNJB15010.006

Element occurrence type:

Survey site name: MARTEN CREEK

EO rank: C/B

EO rank comments: 5 PAIRS PRESENT IN 1993, FEWER IN PREVIOUS YEARS.
3-4 OTHER STREAMS WITHIN 20 KM WITH TOTAL OF
9-12 PAIRS; NO BOATING, LITTLE FISHING.

County: SANDERS

USGS quadrangle: NOXON
BLOOM PEAK

Township: Range: Section: TRS comments:
025N 032W 32 ADDITIONAL SECTIONS

Precision: M

Survey date: Elevation: 2330 - 2850

First observation: 1986 Slope/aspect:

Last observation: 1993-07-29 Size (acres): 0

Location:

THE SOUTH AND NORTH FORKS OF MARTEN CREEK ARE ON THE WEST SIDE OF NOXON RESERVOIR, CA. 8 MILES NW OF TROUT CREEK.

Element occurrence data:

GENERALLY 2 TO 4 PAIRS BREED. (SPECIFIC OBSERVATION DATA ON FILE AT MTNHP.)

General site description:

MOUTH OF MARTEN CREEK IS MAPPED. THIS EO INCLUDES THE NORTH BRANCH (CA. 5 MILES) AND SOUTH BRANCH (CA. 1.5 MILES) AS CONTIGUOUS HABITAT.

Land owner/manager:

KOOTENAI NATIONAL FOREST, CABINET RANGER DISTRICT
PRIVATELY OWNED LAND (INDIVIDUAL OR CORPORATE)

Comments:

Information source: REICHEL, JAMES D. [ZOOLOGIST] MONTANA NATURAL
HERITAGE PROGRAM, 1515 EAST SIXTH AVENUE, P.O. BOX
201800, HELENA, MT 59620-1800. WORK: (406)
444-3009.

Specimens:

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Scientific Name: *HISTRIONICUS HISTRIONICUS*
Common Name: HARLEQUIN DUCK

Global rank: G4 Forest Service status: SENSITIVE
State rank: S2B, SZN Federal Status: C2

Element occurrence code: ABNJB15010.008

Element occurrence type:

Survey site name: VERMILION RIVER

EO rank: D/C

EO rank comments: 3 PAIRS PRESENT IN 1993, FEWER IN PREVIOUS YEARS. 3-4 OTHER STREAMS

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

County: SANDERS

USGS quadrangle: TROUT CREEK
SEVEN POINT MOUNTAIN
VERMILLION PEAK
MILLER LAKE

Township: Range: Section: TRS comments:
024N 031W 12 SW4

Precision: M
Survey date: Elevation: 2340 - 3400
First observation: 1988 Slope/aspect:
Last observation: 1994-07-30 Size (acres): 0

Location:

FROM TROUT CREEK GO NORTH 1.5 MILES ON SR 200, RIGHT 5 MILES ON THE
BLUE SLIDE ROAD, THEN LEFT 2 MILES UP THE VERMILLION RIVER ROAD.

Element occurrence data:

1988: HEN WITH 3 YOUNG OBSERVED. 1989: 2 FEMALES WITH BROODS OBSERVED,
ONE IN MAPPED LOCATION, ONE IN T24N,R30W,8 (SEVERAL MILES UPSTREAM).
1992: OBSERVED SINGLE MALE [T24N,R30W,2] AND SINGLE FEMALE
[T24N,R30W,7]; MALE WAS MARKED.

General site description:

A CA. 10 MILE STREAM SEGMENT, FROM VERMILLION BAY TO VERMILLION FALLS.

Land owner/manager:

KOOTENAI NATIONAL FOREST, CABINET RANGER DISTRICT
PRIVATELY OWNED LAND (INDIVIDUAL OR CORPORATE)
CORPORATE TIMBERLANDS

Comments: PLACER MINING IN AREA. EXTENT OF OCCUPIED BREEDING HABITAT UNKNOWN.

Information source:

Specimens:

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Scientific Name: *HISTRIONICUS HISTRIONICUS*
Common Name: HARLEQUIN DUCK

Global rank: G4 Forest Service status: SENSITIVE
State rank: S2B, SZN Federal Status: C2

Element occurrence code: ABNJB15010.011
Element occurrence type:

Survey site name: SWAMP CREEK
EO rank: D

EO rank comments: 1-2 PAIRS PRESENT. 3-4 OTHER STREAMS WITHIN 20 KM
WITH TOTAL OF 9-12 PAIRS; NO BOATING, LITTLE
FISHING; DIFFICULT ACCESS.

County: SANDERS

USGS quadrangle: GOAT PEAK
NOXON RAPIDS DAM

Township: Range: Section: TRS comments:
025N 031W 16 W2; 4,9,17,19,20

Precision: M
Survey date: Elevation: 2700 -
First observation: 1989 Slope/aspect:
Last observation: 1993-08-02 Size (acres): 0

Location:

FROM SR 200 JUST NORTH OF CABINET RANGER STATION, TAKE COUNTY ROAD AND
FS ROAD #1119 NORTH TO SWAMP CREEK TRAILHEAD; THEN WALK UPSTREAM CA.
0.5 MILE.

Element occurrence data:

SPORADIC SIGHTINGS SINCE 1989; PROBABLY 1 OR 2 BROODS GENERALLY
PRODUCED EACH YEAR. (SPECIFIC OBSERVATION DATA ON FILE AT MTNHP.)

General site description:

STREAM REACH WITH NESTING/REARING HABITAT; EXTENDS CA. 4 MILES
UPSTREAM FROM LOCATION MAPPED.

Land owner/manager:

KOOTENAI NATIONAL FOREST, CABINET RANGER DISTRICT

Comments:

NONE.

Information source: MILLER, V. E. 1989. FIELD SURVEY REPORT, HARLEQUIN
DUCK (*HISTRIONICUS HISTRIONICUS*): LOWER CLARK FORK
RIVER DRAINAGE, WEST-CENTRAL MONTANA. UNPUBLISHED.
47 PP.

Specimens:



MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Scientific Name: *HISTRIONICUS HISTRIONICUS*
Common Name: HARLEQUIN DUCK

Global rank: G4 Forest Service status: SENSITIVE
State rank: S2B, SZN Federal Status: C2

Element occurrence code: ABNJB15010.017
Element occurrence type:

Survey site name: SULLIVAN CREEK

EO rank: D

EO rank comments: NO RECORDS OF MORE THAN 1 PAIR PRESENT. SOME
FISHING, NO BOATING, AND DIFFICULT ACCESS IN MOST
AREAS.

County: FLATHEAD

USGS quadrangle: CONNOR CREEK
QUINTONKON

Township: Range: Section: TRS comments:

026N 016W 31 30

026N 017W 25 11, 12, 14, 24

Precision: M

Survey date: 1993-08-16 Elevation: 3560 - 4150

First observation: 1990 Slope/aspect:

Last observation: 1994-08-05 Size (acres):

Location:

CA. 6 MILES UP FS ROAD #547 ALONG SULLIVAN CREEK, ON THE WEST SIDE OF
HUNGRY HORSE RESERVOIR.

Element occurrence data:

1990: FEMALE AND 4 YOUNG OBSERVED. 1992: 2 UNAGED BIRDS SEEN 8 AUG.

General site description:

CA. 8 MILE STREAM SEGMENT.

Land owner/manager:

FLATHEAD NATIONAL FOREST, SPOTTED BEAR RANGER DISTRICT

Comments:

EXTENT OF OCCUPIED BREEDING HABITAT UNKNOWN. NONE SEEN DURING 2
SURVEYS IN 1993.

Information source:

Specimens:

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Scientific Name: *HISTRIONICUS HISTRIONICUS*
Common Name: HARLEQUIN DUCK

Global rank: G4 Forest Service status: SENSITIVE
State rank: S2B, SZN Federal Status: C2

Element occurrence code: ABNJB15010.019
Element occurrence type:

Survey site name: TRAIL CREEK
EO rank: C/B

EO rank comments: 4-6 PAIRS PRESENT; NO FISHING OR BOATING; ACCESS MODERATE TO DIFFICULT EXCEPT TO LANDOWNERS BELOW FLATHEAD NF. MAY BE PART OF A LARGER COMPLEX WITH KISHENEHN CREEK EO#28. DUCKS HAVE ALSO BEEN REPORTED ON RED MEADOW AND WHALE CREEKS WITH 20 KM.

County: FLATHEAD

USGS quadrangle: TRAILCREEK
MOUNT HEFTY

Township: Range: Section: TRS comments:
037N 022W 30 SE4NE4

Precision: M

Survey date: Elevation: 3800 - 4280

First observation: 1990 Slope/aspect:

Last observation: 1994-08-01 Size (acres):

Location:

TAKE THE NORTH FORK FLATHEAD ROAD PAST POLEBRIDGE TO FS ROAD #114,
THEN CA. 3 MILES WEST.

Element occurrence data:

PROBABLY 2 TO 4 BROODS PRODUCED EACH YEAR. (SPECIFIC OBSERVATION DATA ON FILE AT MTNHP.)

General site description:

A CA. 7 MILE SEGMENT OF MOUNTAIN STREAM, SECTIONS OF WHICH ARE INTERMITTENT DURING LATE SUMMER.

Land owner/manager:

FLATHEAD NATIONAL FOREST, GLACIER VIEW RANGER DISTRICT
PRIVATELY OWNED LAND (INDIVIDUAL OR CORPORATE)
STATE LAND - UNDESIGNATED

Comments: EXTENT OF OCCUPIED BREEDING HABITAT UNKNOWN.

Information source:

Specimens:

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Scientific Name: *HISTRIONICUS HISTRIONICUS*
Common Name: HARLEQUIN DUCK

Global rank: G4 Forest Service status: SENSITIVE
State rank: S2B, SZN Federal Status: C2

Element occurrence code: ABNJB15010.020
Element occurrence type:

Survey site name: BIG CREEK (KOOCANUSA)
EO rank: D
EO rank comments: A SINGLE OBSERVATION AT AN ISOLATED SITE.

County: LINCOLN

USGS quadrangle: PARSNIP MOUNTAIN

Township: Range: Section: TRS comments:
034N 030W 04 SE4

Precision: M
Survey date: 1993-05-30 Elevation: 3300 -
First observation: 1990 Slope/aspect:
Last observation: 1990-08-21 Size (acres):

Location:

FROM THE WEST SIDE OF LAKE KOOCANUSA, TAKE FS ROAD #336 UP BIG CREEK
ROAD CA. 2 MILES UP THE SOUTH FORK.

Element occurrence data:
ONE JUVENILE OBSERVED.

General site description:

Land owner/manager:
KOOTENAI NATIONAL FOREST, REXFORD RANGER DISTRICT

Comments:
SURVEYED IN 1993 FROM 1.5 MI ABOVE COPELAND CREEK DOWN TO SR 228; NO
DUCKS OBSERVED.

Information source: FAIRMAN, L. M. AND V. E. MILLER. 1990. RESULTS OF
1990 SURVEYS FOR HARLEQUIN DUCKS ON THE KOOTENAI
AND LOLO NATIONAL FORESTS, MONTANA.

Specimens:

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Scientific Name: *HISTRIONICUS HISTRIONICUS*
Common Name: HARLEQUIN DUCK

Global rank: G4 Forest Service status: SENSITIVE
State rank: S2B, SZN Federal Status: C2

Element occurrence code: ABNJB15010.021
Element occurrence type:

Survey site name: NORTH CALLAHAN CREEK
EO rank: D
EO rank comments: NEVER MORE THAN 1 PAIR SEEN; ISOLATED EO.

County: LINCOLN

USGS quadrangle: SMITH MOUNTAIN

Township: Range: Section: TRS comments:
031N 035W 23 E2; 24 E2

Precision: M
Survey date: 1993-05-28 Elevation: 2850 -
First observation: 1990-07-23 Slope/aspect:
Last observation: 1990-08-04 Size (acres):

Location:

FROM TROY, TAKE FS ROAD #427 UP CALLAHAN CREEK AND CA. 2 MILES UP
ALONG THE NORTH FORK.

Element occurrence data:

1990: FEMALE AND 3 JUVENILES OBSERVED 23 JULY; 2 JUVENILES OBSERVED 4
AUGUST.

General site description:

Land owner/manager:

KOOTENAI NATIONAL FOREST, THREE RIVERS RANGER DISTRICT

Comments:

SURVEYED IN 1993 - CA. 4 MILES OF BOTH FORKS AND 4 MILES BELOW
JUNCTION. NO DUCKS OBSERVED.

Information source: FAIRMAN, L. M. AND V. E. MILLER. 1990. RESULTS OF
1990 SURVEYS FOR HARLEQUIN DUCKS ON THE KOOTENAI
AND LOLO NATIONAL FORESTS, MONTANA.

Specimens:

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Scientific Name: HISTRIONICUS HISTRIONICUS
Common Name: HARLEQUIN DUCK

Global rank: G4 Forest Service status: SENSITIVE
State rank: S2B,SZN Federal Status: C2

Element occurrence code: ABNJB15010.022

Element occurrence type:

Survey site name: NORTH FORK BLACKFOOT RIVER

EO rank: D

EO rank comments: SINGLE BROODS ARE ONLY RECORDS AT THIS ISOLATED
EO. PARTIALLY IN SCAPEGOAT WILDERNESS AREA, VERY
LITTLE BOATING, MODERATE FISHING.

County: POWELL
LEWIS AND CLARK

USGS quadrangle: LAKE MOUNTAIN

Township: Range: Section: TRS comments:
016N 011W 23 NW4SW4

Precision: M

Survey date: 1993-07-21 Elevation: 4700 -
First observation: 1992-08-28 Slope/aspect: -/-
Last observation: 1994-07-15 Size (acres):

Location:

FROM SR 200 EAST OF OVANDO, FOLLOW SIGNS TO NORTH FORK BLACKFOOT RIVER
TRAILHEAD AND GO UP TRAIL CA. 1 MILE.

Element occurrence data:

1992: 3 DUCKS SIGHTED - JUVENILES, OR HEN WITH 2 JUVENILES. 1991: HEN
WITH 4 JUVENILES SIGHTED (T17N,R10W,S31).

General site description:

Land owner/manager:

LOLO NATIONAL FOREST, SEELEY LAKE RANGER DISTRICT

Comments:

ACTUAL BREEDING LOCATION UNKNOWN, SINCE BROODS MIGHT HAVE TRAVELED
SOME DISTANCE BY DATE OF THESE SIGHTINGS.

Information source:

Specimens:

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Scientific Name: *HISTRIONICUS HISTRIONICUS*

Common Name: HARLEQUIN DUCK

Global rank: G4 Forest Service status: SENSITIVE

State rank: S2B, SZN Federal Status: C2

Element occurrence code: ABNJB15010.023

Element occurrence type:

Survey site name: LITTLE SALMON CREEK

EO rank: D

EO rank comments: 2 PAIRS SEEN. MODERATE FISHING, NO BOATING IN BOB MARSHALL WILDERNESS AREA. MAY BE PART OF A LARGER SOUTH FORK FLATHEAD RIVER EO.

County: FLATHEAD

USGS quadrangle: MARMOT MOUNTAIN
PAGODA MOUNTAIN

Township: Range: Section: TRS comments:

022N 014W 27 NE4NW4

Precision: M

Survey date: Elevation: 4200 - 4250

First observation: 1992-07-23

Slope/aspect: -/-

Last observation: 1994-07-24

Size (acres):

Location:

IN THE BOB MARSHALL WILDERNESS CA. 1.25 MILES UP LITTLE SALMON CREEK FROM THE SOUTH FORK FLATHEAD RIVER.

Element occurrence data:

FEMALE WITH 5 YOUNG (LIGHT COLORED, DOWNY LOOKING) OBSERVED. ALSO FEMALE WITH 3 YOUNG SIGHTED CA. 1 MILE DOWNSTREAM, NEAR PACK BRIDGE.

General site description:

CA. 2 MILE SEGMENT OF MOUNTAIN STREAM.

Land owner/manager:

BOB MARSHALL WILDERNESS

FLATHEAD NATIONAL FOREST, SPOTTED BEAR RANGER DISTRICT

Comments:

EXTENT OF OCCUPIED BREEDING HABITAT UNKNOWN.

Information source:

Specimens:

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Scientific Name: *HISTRIONICUS HISTRIONICUS*
Common Name: HARLEQUIN DUCK

Global rank: G4 Forest Service status: SENSITIVE
State rank: S2B, SZN Federal Status: C2

Element occurrence code: ABNJB15010.024

Element occurrence type:

Survey site name: WHITE RIVER

EO rank: C

EO rank comments: 3 PAIRS SEEN. MODERATE FISHING, NO BOATING IN BOB MARSHALL WILDERNESS AREA. MAY BE PART OF A LARGER SOUTH FORK FLATHEAD RIVER EO.

County: FLATHEAD
POWELL

USGS quadrangle: HAYSTACK MOUNTAIN

Township: Range: Section: TRS comments:
021N 012W 6 SE4SW4

Precision: M

First observation: 1992-07-19 Slope/aspect: -/-

Last observation: 1994-07-23 Size (acres):

Location:

IN THE BOB MARSHALL WILDERNESS, NEAR THE CONFLUENCE OF WHITE RIVER AND ITS SOUTH FORK, CA. 15 AIR MILES ENE OF BENCHMARK.

Element occurrence data:

3 BROODS SIGHTED; 2 (FEMALE +3, FEMALE +1) AT SOUTH END OF CANYON BELOW NEEDLE FALLS AND 1 (FEMALE +2) CA. 0.5 MILE DOWNSTREAM OF CONFLUENCE.

General site description:

CA. 2 MILE SEGMENT OF MOUNTAIN STREAM.

Land owner/manager:

BOB MARSHALL WILDERNESS

FLATHEAD NATIONAL FOREST: SPOTTED BEAR RANGER DISTRICT

Comments:

EXTENT OF OCCUPIED BREEDING HABITAT UNKNOWN

Information source:

Specimens:

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Scientific Name: *HISTRIONICUS HISTRIONICUS*
Common Name: HARLEQUIN DUCK

Global rank: G4 Forest Service status: SENSITIVE
State rank: S2B, SZN Federal Status: C2

Element occurrence code: ABNJB15010.029

Element occurrence type:

Survey site name: SPOTTED BEAR RIVER

EO rank: D

EO rank comments: NO RECORDS OF MORE THAN 2 PAIRS PRESENT. SOME FISHING AND BOATING. RELATIVELY EASY ACCESS AFTER THE ROAD OPENS (USUALLY AFTER JULY 1). MAY BE PART OF A LARGER SOUTH FORK FLATHEAD RIVER EO.

County: FLATHEAD

USGS quadrangle: WHITCOMB PEAK

Township:	Range:	Section:	TRS	comments:
025N	014W	14	13	

Precision: M

Survey date:

Elevation: 4050 - 4200

First observation: 1992-08-13

Slope/aspect: -/-

FROM HUNGRY HORSE, GO UP EAST SIDE OF RESERVOIR TO SPOTTED BEAR RIVER

PROBABLY 1 OR 2 BROODS PRODUCED EACH YEAR. (SPECIFIC OBSERVATION DATA

General site description:

REFERENCES

OWNER/manager: PLATYPUS NATIONAL FOREST SPOTTED BEAR RANGER DISTRICT

© 2009 by the

EXTENT OF OCCUPIED BREEDING HABITAT UNKNOWN. NOTE REPORT OF SINGLE FEMALE AT DEAN FALLS, CA. 10 MILES UPSTREAM OF WHITCOMB CREEK, ON 8/4/93.

Information source:

Specimens:

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Scientific Name: *HISTRIONICUS HISTRIONICUS*
Common Name: HARLEQUIN DUCK

Global rank: G4 Forest Service status: SENSITIVE
State rank: S2B, SZN Federal Status: C2

Element occurrence code: ABNJB15010.033
Element occurrence type:

Survey site name: GRAVE CREEK
EO rank:

EO rank comments:

County: LINCOLN

USGS quadrangle: STAHL PEAK
MOUNT MARSTON

Township: Range: Section: TRS comments:
036N 025W 15 1, 11, 12, 14, 22
037N 024W 32

Precision: M
Survey date: Elevation: 3600 - 4500
First observation: 1989 Slope/aspect:
Last observation: 1994-07-31 Size (acres):

Location:

FROM US HIGHWAY 93 SOUTH OF EUREKA, GO UP THE GRAVE CREEK ROAD CA. 10 MILES.

Element occurrence data:

FEMALE WITH 4 JUVENILES CAPTURED AND BANDED. ADDITIONAL SIGHTINGS OF ADULTS--ESPECIALLY IN SECTION UPSTREAM FROM BLUE SKY CREEK.

General site description:

Land owner/manager:

KOOTENAI NATIONAL FOREST, FORTINE RANGER DISTRICT

Comments:

TOTAL EXTENT OF OCCUPIED HABITAT UNKNOWN.

Information source: ZOOLOGIST, MONTANA NATURAL HERITAGE PROGRAM, 1515 EAST SIXTH AVENUE, P.O. BOX 210800, HELENA, MT 59620-1800. 406/444-3009.

Specimens:





